

What Is Claimed Is:

- 1 An isolated DNA molecule, comprising a nucleotide sequence selected from the group consisting of:
- 5 (a) the nucleotide sequence shown in SEQ ID NO:1, or the complement thereof;
- (b) a nucleotide sequence that hybridizes to said nucleotide sequence of (a) under a wash stringency equivalent to 0.5X SSC to 2X SSC, 0.1% SDS, at 55-65°C, and which encodes a polypeptide
- 10 having enzymatic activity similar to that of *Arabidopsis thaliana* plastid pyruvate dehydrogenase complex E1 $\alpha$  subunit;
- (c) a nucleotide sequence encoding the same
- 15 genetic information as said nucleotide sequence of (a), but which is degenerate in accordance with the degeneracy of the genetic code; and
- (d) a nucleotide sequence encoding the same
- 20 genetic information as said nucleotide sequence of (b), but which is degenerate in accordance with the degeneracy of the genetic code.
2. A recombinant vector, comprising said isolated DNA molecule of claim 1.
3. A host cell transformed with said recombinant vector of claim 2.
4. An isolated polypeptide having the amino acid sequence of SEQ ID NO.:2.
5. An isolated DNA molecule, comprising a nucleotide sequence selected from the group consisting of:

(a) the nucleotide sequence shown in SEQ ID  
5 NO:3, or the complement thereof;

(b) a nucleotide sequence that hybridizes to  
said nucleotide sequence of (a) under a wash  
stringency equivalent to 0.5X SSC to 2X SSC, 0.1%  
SDS, at 55-65°C, and which encodes a polypeptide  
10 having enzymatic activity similar to that of  
*Arabidopsis thaliana* plastid pyruvate dehydrogenase  
complex E1 $\beta$  subunit;

(c) a nucleotide sequence encoding the same  
genetic information as said nucleotide sequence of  
15 (a), but which is degenerate in accordance with the  
degeneracy of the genetic code; and

(d) a nucleotide sequence encoding the same  
genetic information as said nucleotide sequence of  
(b), but which is degenerate in accordance with the  
degeneracy of the genetic code.

6. A recombinant vector, comprising said  
isolated DNA molecule of claim 5.

7. A host cell transformed with said  
recombinant vector of claim 6.

8. An isolated polypeptide having the amino  
acid sequence of SEQ ID NO.:4.

9. An isolated DNA molecule, comprising a  
nucleotide sequence selected from the group  
consisting of:

(a) the nucleotide sequence shown in SEQ ID  
5 NO:5, or the complement thereof;

(b) a nucleotide sequence that hybridizes to  
said nucleotide sequence of (a) under a wash  
stringency equivalent to 0.5X SSC to 2X SSC, 0.1%  
SDS, at 55-65°C, and which encodes a polypeptide

10 having enzymatic activity similar to that of  
*Arabidopsis thaliana* plastid pyruvate dehydrogenase  
complex E2 component;

(c) a nucleotide sequence encoding the same  
genetic information as said nucleotide sequence of  
15 (a), but which is degenerate in accordance with the  
degeneracy of the genetic code; and

(d) a nucleotide sequence encoding the same  
genetic information as said nucleotide sequence of  
(b), but which is degenerate in accordance with the  
degeneracy of the genetic code.

10. A recombinant vector, comprising said  
isolated DNA molecule of claim 9.

11. A host cell transformed with said  
recombinant vector of claim 10.

12. An isolated polypeptide having the amino  
acid sequence of SEQ ID NO.:6.

13. An isolated DNA molecule, comprising a  
nucleotide sequence selected from the group  
consisting of:

(a) the nucleotide sequence shown in SEQ ID  
5 NO:11, or the complement thereof;

(b) a nucleotide sequence that hybridizes to  
said nucleotide sequence of (a) under a wash  
stringency equivalent to 0.5X SSC to 2X SSC, 0.1%  
SDS, at 55-65°C, and which encodes a polypeptide  
10 having enzymatic activity similar to that of  
*Arabidopsis thaliana* branched chain 2-oxoacid  
dehydrogenase complex E1 $\alpha$  subunit;

(c) a nucleotide sequence encoding the same  
genetic information as said nucleotide sequence of

15 (a), but which is degenerate in accordance with the degeneracy of the genetic code; and

(d) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (b), but which is degenerate in accordance with the degeneracy of the genetic code.

14. A recombinant vector, comprising said isolated DNA molecule of claim 13.

15. A host cell transformed with said recombinant vector of claim 14.

16. An isolated polypeptide having the amino acid sequence of SEQ ID NO.:12.

17. An isolated DNA molecule, comprising a nucleotide sequence selected from the group consisting of:

(a) the nucleotide sequence shown in SEQ ID NO:13, or the complement thereof;

(b) a nucleotide sequence that hybridizes to said nucleotide sequence of (a) under a wash stringency equivalent to 0.5X SSC to 2X SSC, 0.1% SDS, at 55-65°C, and which encodes a polypeptide having enzymatic activity similar to that of *Arabidopsis thaliana* branched chain 2-oxoacid dehydrogenase complex E1 $\beta$  subunit;

(c) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (a), but which is degenerate in accordance with the degeneracy of the genetic code; and

(d) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (b), but which is degenerate in accordance with the degeneracy of the genetic code.

18. A recombinant vector, comprising said isolated DNA molecule of claim 17.

19. A host cell transformed with said recombinant vector of claim 18.

20. An isolated polypeptide having the amino acid sequence of SEQ ID NO. 14.

Sub  
a47 21. The isolated DNA molecule of claim 17, wherein the naturally occurring branched chain oxoacid dehydrogenase complex E2 component binding region thereof is replaced with the E2 component binding region of a plastid pyruvate dehydrogenase complex E1 $\beta$  subunit.

22. The isolated DNA molecule of claim 21, wherein said plastid pyruvate dehydrogenase complex E1 $\beta$  subunit has the sequence shown in SEQ ID NO.:3.

23. A recombinant vector, comprising said isolated DNA molecule of claim 22.

24. A host cell transformed with said recombinant vector of claim 23.

25. An isolated DNA molecule, comprising a nucleotide sequence selected from the group consisting of:

(a) the nucleotide sequence shown in SEQ ID NO:15, or the complement thereof;

(b) a nucleotide sequence that hybridizes to said nucleotide sequence of (a) under a wash stringency equivalent to 0.5X SSC to 2X SSC, 0.1% SDS, at 55-65°C, and which encodes a polypeptide having enzymatic activity similar to that of

*Arabidopsis thaliana* branched chain 2-oxoacid dehydrogenase complex E2 component;

15 (c) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (a), but which is degenerate in accordance with the degeneracy of the genetic code; and

(d) a nucleotide sequence encoding the same genetic information as said nucleotide sequence of (b), but which is degenerate in accordance with the degeneracy of the genetic code.

26. A recombinant vector, comprising said isolated DNA molecule of claim 25.

27. A host cell transformed with said recombinant vector of claim 26.

28. An isolated polypeptide having the amino acid sequence of SEQ ID NO.:16.

29. A plant, a plastid of which comprises the following polypeptides:

an enzyme that enhances the biosynthesis of 2-oxobutyrates;

5 a branched chain oxoacid dehydrogenase complex E1 $\alpha$  subunit;

a branched chain oxoacid dehydrogenase complex E1 $\beta$  subunit; and

a branched chain oxoacid dehydrogenase complex E2 component.

30. The plant of claim 29, wherein said branched chain oxoacid dehydrogenase complex E1 $\alpha$  subunit has the sequence shown in SEQ ID NO.:12, said branched chain oxoacid dehydrogenase complex E1 $\beta$  subunit has the sequence shown in SEQ ID NO.:14, or

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said branched chain oxoacid dehydrogenase complex E2 component has the sequence shown in SEQ ID NO.:16.

31. The plant of claim 29, wherein said plastid further comprises the following polypeptides:

- a  $\beta$ -ketothiolase;
- a  $\beta$ -ketoacyl-CoA reductase; and
- 5 a polyhydroxyalkanoate synthase.

32. The plant of claim 31, the genome of which comprises introduced DNAs encoding said polypeptides, wherein each of said introduced DNAs is operatively linked to a targeting peptide coding region capable  
5 of directing transport of said polypeptide encoded thereby into a plastid.

33. A method of producing P(3HB-co-3HV) copolymer, comprising growing said plant of claim 32, and recovering P(3HB-co-3HV) copolymer produced thereby.

34. A plant, a plastid of which comprises the following polypeptides:

- an enzyme that enhances the biosynthesis of 2-oxobutyrates;
- 5 a branched chain oxoacid dehydrogenase complex E1 $\alpha$  subunit;
- a branched chain oxoacid dehydrogenase complex E1 $\beta$  subunit;
- a branched chain oxoacid dehydrogenase complex  
10 E2 component; and
- a dihydrolipoamide dehydrogenase E3 component.

35. The plant of claim 34, wherein said branched chain oxoacid dehydrogenase complex E1 $\alpha$

subunit has the sequence shown in SEQ ID NO.:12, said  
branched chain oxoacid dehydrogenase complex E1 $\beta$

- 5 subunit has the sequence shown in SEQ ID NO.:14, or  
said branched chain oxoacid dehydrogenase complex E2  
component has the sequence shown in SEQ ID NO.:16.

36. The plant of claim 34, wherein said plastid  
further comprises the following polypeptides:

- a  $\beta$ -ketothiolase;  
a  $\beta$ -ketoacyl-CoA reductase; and  
5 a polyhydroxyalkanoate synthase.

37. The plant of claim 36, the genome of which  
comprises introduced DNAs encoding said polypeptides,  
wherein each of said introduced DNAs is operatively  
linked to a targeting peptide coding region capable  
5 of directing transport of said polypeptide encoded  
thereby into a plastid.

38. A method of producing P(3HB-co-3HV)  
copolymer, comprising growing said plant of claim 37  
and recovering P(3HB-co-3HV) copolymer produced  
thereby.

39. A plant, a plastid of which comprises the  
following polypeptides:

- an enzyme that enhances the biosynthesis of  
2-oxobutyrates;  
5 a branched chain oxoacid dehydrogenase complex  
E1 $\alpha$  subunit; and  
a branched chain oxoacid dehydrogenase complex  
E1 $\beta$  subunit, the naturally occurring E2 binding  
region of which is replaced with the E2 binding  
10 region of a plastid pyruvate dehydrogenase complex  
E1 $\beta$  subunit.



41. The plant of claim 39, wherein said plastid further comprises the following polypeptides:

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